UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/589,284	06/20/2008	Minoru Ishijima	2006_I210A	5716

513   7590   04/25/2011
WENDEROTH, LIND & PONACK, L.L.P.
1030 15th Street, N.W.,
Suite 400 East
Washington, DC 20005-1503

EXAMINER
SKROUPA, JOSHUA

ART UNIT	PAPER NUMBER
3679	

NOTIFICATION DATE	DELIVERY MODE
04/25/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

ddalecki@wenderoth.com
eoa@wenderoth.com

	Application No.	Applicant(s)
Office Action Summary	10/589,284	ISHIJIMA ET AL.
	Examiner	Art Unit	
	Josh Skroupa	3679	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *20 June 2008*.

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-16* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-16* is/are rejected.

7) ☐ Claim(s) _____ is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☒ The specification is objected to by the Examiner.

10) ☒ The drawing(s) filed on *11 August 2006* is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☒ All b) ☐ Some * c) ☐ None of:

      1. ☐ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____.

      3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4) ☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5) ☐ Notice of Informal Patent Application

6) ☐ Other: _____.

DETAILED ACTION

Drawings

1.   The drawings are objected as failing to comply with:

a.   37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, "a contact angle (θ) between the track and the ball is in a range of $30° \leq \theta \leq 40°$", as set forth in claims 4 and 12-14, and where "elastic pressure is applied in an axial direction so as to separate the inner member and the retainer", as set forth in claim 1, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

b.   37 CFR 1.84(p)(4) because reference character "A" has been used to designate both a fixed constant velocity universal joint in Figure 1 and the center of track groove 11b in Figure 9a.

c.   37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: "PCD_{BALL}" and "θ" and because they include the following reference character(s) not mentioned in the description: "2c" and "5b".

Corrected drawing sheets in compliance with 37 CFR 1.121(d), or amendment to the specification to add the reference character(s) in the description in compliance with 37 CFR 1.121(b), are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as

"amended." If a drawing figure is to be canceled, the appropriate figure must be

removed from the replacement sheet, and where necessary, the remaining figures must

be renumbered and appropriate changes made to the brief description of the several

views of the drawings for consistency. Additional replacement sheets may be necessary

to show the renumbering of the remaining figures. Each drawing sheet submitted after

the filing date of an application must be labeled in the top margin as either

"Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are

not accepted by the examiner, the applicant will be notified and informed of any required

corrective action in the next Office action. The objection to the drawings will not be held

in abeyance.

Specification

2.   The disclosure is objected to because of the following informalities:

        a.   Page 4, Line 21, "ensure the enough" should read --ensure enough--.

        b.   Page 6, Line 7, "that the enough" should read --that enough--.

Appropriate correction is required.

3.   The lengthy specification has not been checked to the extent necessary to

determine the presence of all possible minor errors. Applicant's cooperation is

requested in correcting any errors of which applicant may become aware in the

specification.

Claim Objections

4.   The claims are objected to as failing to comply with 37 CFR 1.75(i) because elements of the claims are not separated by line indentation. Appropriate correction is required.

5.   Claims 3 and 11 are objected to because on Lines 2-4, "where F is an offset amount of inner/outer member (offset amount between the center of the track with respect to a center of inner/outer spherical surface)" should read --where F is an offset amount between the center of the wedge-shaped ball track with respect to a center of the spherical inner surface of the outer member or the spherical outer surface of the inner member--, as best understood by the examiner. Appropriate correction is required.

Claim Rejections - 35 USC § 112

6.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7.   Claims 1-16 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

   a.   Claims 1 and 8 recite the limitation "the ball" on lines 10 and 8, respectively. It is not possible to determine which, if any, of the previously recited balls is "the ball". Claims 2-7 and 9-16 inherit this issue as they depend from the rejected claim

b.   Claim 2 recites the limitation "the outer joint member" in Line 2. There is insufficient antecedent basis for this limitation in the claim; an outer joint member was not previously recited. Claims 11, 12 and 14 inherit this issue as they depend from the rejected claim.

c.   Claim 5 recites the limitation "the torque transmission ball" in Line 4. There is insufficient antecedent basis for this limitation in the claim; a torque transmission ball was not previously recited; it is unclear whether this "torque transmission ball" is the same as the "balls" recited in claim 1. Claims 6, 7 and 15 inherit this issue as they depend from the rejected claim.

d.   Claim 8 recites the limitation "the inner joint member" in Line 7. There is insufficient antecedent basis for this limitation in the claim; an inner joint member was not previously recited. Claims 9, 10 and 16 inherit this issue as they depend from the rejected claim.

e.   Claim 8 recites the limitation "the torque transmission ball" in Line 12. There is insufficient antecedent basis for this limitation in the claim; a torque transmission ball was not previously recited; it is unclear whether this "torque transmission ball" is the same as the "balls" recited in Line 4. Claims 9, 10 and 16 inherit this issue as they depend from the rejected claim.

Claim Rejections - 35 USC § 103

8.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all

obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set
> forth in section 102 of this title, if the differences between the subject matter sought to be patented and
> the prior art are such that the subject matter as a whole would have been obvious at the time the
> invention was made to a person having ordinary skill in the art to which said subject matter pertains.
> Patentability shall not be negatived by the manner in which the invention was made.

9.   Claims 1-3 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable

over US 2003/0083135 (Yamazaki) in view of US 6,120,382 (hereinafter Sone).

   a.   **Regarding claim 1**, Yamazaki discloses, a constant velocity universal

joint in Figure 1 comprising an outer member (1) which is provided with a

spherical inner surface (1b) in which a plurality of track grooves (1a) are formed

and an inner member (2) which is provided with a spherical outer surface () in

which a plurality of track grooves (2a) are formed. Balls (3) are disposed in a

wedge-shaped ball track (2b) which is formed by the synergy between the track

groove of the outer member and the track groove of the inner member. A

retainer (4) is disposed between the spherical inner surface of the outer member

and the spherical outer surface of the inner member to hold the balls. Elastic

pressure is applied in an axial direction so as to separate the inner member and

the retainer (see elastic member 12 and Paragraph [0042], Lines 10-16).

   Yamazaki does not expressly disclose a ratio r1 (= PCD_{BALL}/D_{BALL}) of a

pitch circle diameter (PCD_{BALL}) of the ball to a diameter (D_{BALL}) of the ball is in a

range of 1.5 ≤ r1 ≤ 4.0. Sone explains that setting the ratio r1 (= PCD_{BALL}/D_{BALL})

to be within a range 3.3 ≤ r1 ≤ 5.0 provides a greater degree of strength of the

outer joint member, load capacity and durability than a typical constant velocity joint (Column 2, Lines 6 and 40-43). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the constant velocity universal joint of Yamazaki with the ratio r1 (= PCD_{BALL}/D_{BALL}) within a range $3.3 \leq r1 \leq 5.0$ as taught by Sone in order to provides a greater degree of strength of the outer joint member, load capacity and durability.

b.   **Regarding claim 2**, the combination of Yamazaki and Sone teaches the constant velocity universal joint according to claim 1. Sone discloses a ratio r2 (= D_{OUTER}/PCD_{SERR}) of an outside diameter (D_{OUTER}) of the outer joint member to a pitch circle diameter (PCD_{SERR}) of teeth of the inner member is in a range of $3.0 \leq r2 \leq 5.0$. Sone explains that setting a ratio r2 (= D_{OUTER}/PCD_{SERR}) within the range $2.5 \leq r2 \leq 3.5$ provides a greater degree of strength of the outer joint member, durability, and compactness of the joint (Column 2, Lines 60-65 and Column 3, Lines 3-18).

c.   **Regarding claims 3 and 11**, the combination of Yamazaki and Sone teaches the constant velocity universal joint according to claims 1 and 2. Sone discloses a ratio R1 defined by F/PCR, where F is an offset amount between the center of the wedge-shaped ball track with respect to a center of the spherical inner surface of the outer member or the spherical outer surface of the inner member and PCR is a length of a segment connecting the center of the track and the center of the ball, the ratio R1 (= F/PCR) is in a range of $0.109 \leq R1 \leq 0.162$. Sone explains that setting a ratio R1 (= F/PCR) to be within a range $0.069 \leq R1 \leq$

0.121 maintains an allowable load torque, cage strength, durability and maximum operating angle while reducing track load (Column 3, Lines 21-28 and Column 4 Lines 2-6).

10.   **Claims 4 and 12-14** are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki and Sone as applied to claim 1 above and further in view of US 2001/0021671 (hereinafter Ouchi). The combination of Yamazaki and Sone teaches the constant velocity joint according to claims 1-3 and 11. Yamazaki and Sone each disclose the number of torque transmission balls being equal to six or less (Paragraph [0035], Lines 15 & 16 of Yamazaki, and Column 1, Lines 26 & 27 and Figure 23A of Sone). The combination of Yamazaki and Sone does not expressly disclose a contact angle between the track and the ball being in a range of $30° \leq \theta \leq 40°$. Ouchi shows, in Figure 8, a contact angle (θ) being set to approximately 40 degrees (Paragraph [0129], Lines 1-3). Ouchi explains that if the contact angle is well over 40 degrees, a rolling surface might be exfoliated at an early stage. (Paragraph [0130], Lines 1-8). Ouchi further explains that if the contact angle is well under 40 degrees, the torque transmitted via the balls decreases, while the load applied to the balls increase, thus leading to a joint with poor efficiency (Paragraph [0130], Lines 9-15). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the constant velocity universal joint taught by Yamazaki and Sone with the contact angle being set to approximately 40 degrees as taught by Ouchi to prevent early exfoliation of a rolling surface, while providing proper torque transmission and load through the balls to maintain joint efficiency.

11.   Claims 5-7 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamazaki and Sone as applied to claims 1-3 above, and further in view of US 2002/0022528 (hereinafter Nakagawa).

a.   **Regarding claims 5 and 6**, the combination of Yamazaki and Sone teaches the constant velocity universal joint of claim 1. Yamazaki discloses the ball track being open to one of axial directions in the shape of a wedge (Paragraph [0010], Lines 6-8) and the retainer having pockets (4a). Sone also discloses the ball track being open to one of axial directions in the shape of a wedge (Column 3 Line 21) and the retainer having pockets (4c). Yamazaki and Sone do not expressly disclose the pockets having corner round sections and a ratio (R/d) between a radius of curvature R of the corner round section and a diameter d of the torque transmission ball is $R/d \geq 0.22$, and further being within a range $0.45 \leq R/d \leq 0.62$. Nakagawa teaches a ratio between a radius of curvature R of corner round sections of a cage, or retainer, and a diameter d of torque transmitting balls being $R/d \geq 0.22$, and further within a range $0.45 \leq R/d \leq 0.62$ (Paragraph [0013], Lines 13-17). Nakagawa explains that maintaining this ratio reduces a maximum principal stress load on a column portion of a retainer, thus improving the strength and durability of the retainer (Paragraph [0019], Lines 25, 29-32, 35 & 36). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the constant velocity universal joint taught by Yamazaki and Sone with the ratio R/d being in a range $0.45 \leq R/d \leq 0.62$ in order to reduce a maximum principal stress load on a

column portion of a retainer and improve the strength and durability of the
retainer.

b.   **Regarding claims 7 and 15**, the combination of Yamazaki, Sone and
Nakagawa teaches the constant velocity universal joint according to claims 5 and
6. Nakagawa discloses lengths of a plurality of pockets corresponding to a
plurality of track grooves in a circumferential direction of a window all being equal
(Paragraph [0022], Lines 1 & 2).

12.   Claims 8-10 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable
over Yamazaki in view of Nakagawa.

a.   **Regarding claims 8 and 9**, Yamazaki discloses, a constant velocity
universal joint in Figure 1 comprising an outer member (1) which is provided with
a spherical inner surface (1b) in which a plurality of track grooves (1a) are formed
and an inner member (2) which is provided with a spherical outer surface () in
which a plurality of track grooves (2a) are formed. Balls (3) are disposed in a
wedge-shaped ball track (2b) which is formed by the synergy between the track
groove of the outer member and the track groove of the inner member. A
retainer (4) is disposed between the spherical inner surface of the outer member
and the spherical outer surface of the inner member to hold the balls. The balls
always make contact with the ball track by preload applying means (see elastic
member 12 and Paragraph [0042], Lines 10-16). The ball track is open to one of
axial directions in the shape of a wedge (see Figure 1). Pockets (4a) are
included in the retainer.

Yamazaki does not expressly disclose the pockets having corner round sections or a ratio (R/d) between a radius of curvature (R) of the comer round section and a diameter (d) of the torque transmission ball is R/d > 0.22, and further being within a range 0.45 ≤ R/d ≤ 0.62. Nakagawa teaches a ratio between a radius of curvature R of corner round sections of a cage, or retainer, and a diameter d of torque transmitting balls being R/d ≥ 0.22, and further within a range 0.45 ≤ R/d ≤ 0.62 (Paragraph [0013], Lines 13-17). Nakagawa explains that maintaining this ratio reduces a maximum principal stress load on a column portion of a retainer, thus improving the strength and durability of the retainer (Paragraph [0019], Lines 25, 29-32, 35 & 36). It would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the constant velocity universal joint disclosed by Yamazaki with the ratio R/d being in a range 0.45 ≤ R/d ≤ 0.62 in order to reduce a maximum principal stress load on a column portion of a retainer and improve the strength and durability of the retainer.

b.   **Regarding claims 10 and 16**, the combination of Yamazaki and Nakagawa teaches the constant velocity universal joint for steering according to claims 8 and 9. Nakagawa discloses lengths of a plurality of pockets (4c) corresponding to a plurality of the track grooves in a circumferential direction of a window all being equal (Paragraph [0022], Lines 1 & 2).

Conclusion

13.   The prior art made of record and not relied upon is considered pertinent to

applicant's disclosure. US 6,332,844 (Hayama) discloses a constant velocity universal

joint having a ratio r1 (= PCD_{BALL}/D_{BALL}) in a range $3.3 \le r1 \le 5.0$ and a ratio r2 (=

D_{OUTER}/PCD_{SERR}) in a range $2.5 \le r2 \le 3.2$. US 6,386,983 (Sone) discloses a constant

velocity universal joint having a ratio r1 (= PCD_{BALL}/D_{BALL}) in a range $3.3 \le r1 \le 5.0$, a

ratio r2 (= D_{OUTER}/PCD_{SERR}) in a range $2.5 \le r2 \le 3.5$, and a ratio R1 (=F/PCR) in a

range $0.069 \le R1 \le 0.121$. US 6,402,623 (Ouchi) discloses a constant velocity universal

joint having a contact angle between a track and ball being approximately 40 degrees.

14.   Any inquiry concerning this communication or earlier communications from the

examiner should be directed to Josh Skroupa whose telephone number is (571)270-

3220. The examiner can normally be reached on Monday-Friday, 6:00 AM - 2:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's

supervisor, Daniel P. Stodola can be reached on (571)272-7087. The fax phone

number for the organization where this application or proceeding is assigned is 571-

273-8300.

Information regarding the status of an application may be obtained from the

Patent Application Information Retrieval (PAIR) system. Status information for

published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see http://pair-direct.uspto.gov. Should

you have questions on access to the Private PAIR system, contact the Electronic

Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a

USPTO Customer Service Representative or access to the automated information

system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/J. S./   /Greg Binda/
Examiner, Art Unit 3679   Primary Examiner, Art Unit 3679